

**IN THE ABSTRACT:**

Delete the abstract now of record and insert therefor the new abstract submitted herewith on a separate sheet.

**ADDITIONAL FEE:**

A check in the amount of \$264.00 is enclosed to cover the cost of one (1) extra independent claim and ten (10) claims in excess of 20 total. Should the check prove insufficient for any reason, authorization is hereby given to charge any such deficiency to our Deposit Account No. 01-0268.

**REMARKS**

In the last Office Action, the Examiner withdrew claim 18 from further consideration as being directed to a non-elected invention. Claim 1 was rejected under 35 U.S.C. §102(a) as being anticipated by U.S. Patent No. 5,176,140 to Kami et al. ("Kami") or U.S. Patent No. 4,086,916 to Freeman et al. ("Freeman"). Claims 2, 3 and 11-13 were rejected under 35 U.S.C. §102(a) as being anticipated by Freeman. Claims 4-9 and 17 were rejected under 35 U.S.C. §103(a) as being unpatentable over Kami or U.S. Patent No. 6,394,960 to Shinogi et al. ("Shinogi"). Claim 10 was rejected under 35 U.S.C. §103(a) as being unpatentable over Freeman in view of U.S. Patent No. 3,859,900 to Langley or U.S. Patent No. 6,443,900 to Adachi et al. ("Adachi"). Claim 16 was rejected under 35

U.S.C. §103(a) as being unpatentable over Freeman in view of U.S. Patent No. 4,651,310 to Kaneko et al. ("Kaneko") or vice-versa. Claims 14 and 15 were objected to as being dependent upon a rejected base claim, but indicated to be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Applicants and applicants' counsel note with appreciation the indication of allowable subject matter concerning claims 14 and 15. However, for the reasons noted below, applicants respectfully submit that amended claims 1-7, 11-13, 16-17 and newly added claims 19-35 also patentably distinguish from the prior art of record.

In accordance with the present response, original independent claims 1 and 2 have been amended to incorporate the subject matter of allowable claim 14, which has been canceled. Claims 1-7, 11-13 and 15-17 have also been amended in formal respects to improve the wording thereof. Non-elected claim 18 has been canceled without prejudice or admission and subject to applicants' right to file a continuing application to pursue the subject matter of the non-elected claim. Claims 8-10 have been canceled without prejudice or admission. New claims 19-35 have been added to provide a fuller scope of coverage.

Attached hereto is a marked-up version of the changes made to the abstract and claims by the current amendment. The attached pages i-vii are captioned "VERSION WITH MARKINGS TO SHOW CHANGES MADE".

Amended independent claim 1 recites the subject matter of original allowable claim 14 and, therefore, is also allowable over the prior art of record. More specifically, with reference to the embodiment shown in Figs. 1-2 and 15, amended independent claim 1 requires a pulse detection device comprising a base plate 43 having a first main surface disposable against a part (e.g., a wrist) of a living body 2, a second main surface disposed opposite the first main surface, and a channel 66 formed in the second main surface. A first piezoelectric element 41 is disposed in the channel 66 of the base plate 43 for transmitting an ultrasonic signal toward an artery in the living body 2. A second piezoelectric element 44 is disposed in the channel 66 of the base plate for receiving the ultrasonic signal transmitted by the first piezoelectric element 43 and reflected by the artery.

By disposing the first and second piezoelectric elements in a channel formed in a surface of the base plate, a pulse detection device is provided which is uniform in quality and which detects pulse information without considerable variation in sensitivity as compared to the conventional art.

Amended independent claim 2 is directed to a pulse detection device and also recites the subject matter of allowable claim 14. Claim 2 requires a base plate having a first main surface disposable against a part of a living body during use of the pulse detection device, a second main surface disposed opposite the first main surface, and a channel formed in the second main surface. Amended independent claim 2 further requires a transmitting piezoelectric element disposed in the channel of the base plate for generating an ultrasonic signal and transmitting the ultrasonic signal toward an artery in the living body, and a receiving piezoelectric element disposed in the channel of the base plate for receiving the ultrasonic signal transmitted by the transmitting piezoelectric element and reflected by the artery and for converting the reflected ultrasonic signal into an electrical signal. As recognized by the Examiner, no corresponding structural combination is disclosed or suggested by the prior art of record.

New independent claim 22 is directed to a pulse detection device and requires a base plate having a first surface disposable against a part of a living body and a second surface disposed opposite to the first surface, a transmitter provided on the base plate so as to not protrude from the second surface of the base plate for transmitting an ultrasonic signal toward an artery in the living body, and a receiver provided on the base plate so as to not protrude from

the second surface of the base plate for receiving the ultrasonic signal transmitted by the transmitter and reflected by the artery. No corresponding structural combination is disclosed or suggested by the prior art of record. For example, Kaneko, Langley, Adachi, Shinogi and Freeman do not disclose or suggest a transmitter and a receiver which are provided on a base plate so as to not protrude from a surface which is disposed opposite to a surface thereof disposable against a part of a living body, as required by independent claim 22.

New independent claim 33 is also directed to a pulse detection device and requires a base plate having a first surface disposable against a part of a living body containing the artery and a second surface disposed opposite the first surface, the transmitting means and the receiving means being disposed on the base plate so as to not protrude from the second surface. Again, no corresponding structural combination is disclosed or suggested by the prior art of record.

Claims 3-7, 11-13, 15-17, 19-21, 23-32 and 34-35 depend on and contain all of the limitations of independent claims 2, 22 and 33, respectively, and, therefore, distinguish from the references at least in the same manner as claims 2, 22 and 33.

In view of the foregoing amendments and discussion,  
the application is now believed to be in condition for  
allowance. Accordingly, favorable and reconsideration and  
allowance of the claims are most respectfully requested.

Respectfully submitted,

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MAILING CERTIFICATE

I hereby certify that this correspondence is being deposited with the United States Postal Service as first-class mail in an envelope addressed to: MS FEE AMENDMENT, COMMISSIONER FOR PATENTS, P.O. Box 1450, Alexandria, VA 22313-1450, on the date indicated below.

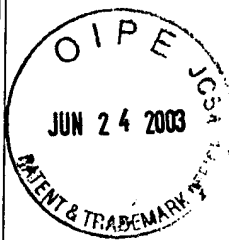
Bruce L. Adams

Name

  
Signature

June 18, 2003

Date



VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE ABSTRACT:

The original abstract has been replaced with the following new abstract:

A pulse detection device has a base plate having a first main surface disposable against a part of a living body during use of the pulse detection device, a second main surface disposed opposite the first main surface, and a channel formed in the second main surface. A first piezoelectric element is disposed in the channel of the base plate for transmitting an ultrasonic signal toward an artery in the living body. A second piezoelectric element is disposed in the channel of the base plate for receiving the ultrasonic signal transmitted by the first piezoelectric element and reflected by the artery.

IN THE CLAIMS:

Claims 1-7, 11-13 and 15-17 have been amended as follows:

1. (Amended) A pulse detection device comprising:  
a base plate having a first main surface disposable against a part of a living body during use of the pulse detection device, a second main surface disposed opposite the first main surface, and a channel formed in the second main surface;

a first piezoelectric element disposed in the channel of the base plate for transmitting an ultrasonic signal toward an artery in the [ultrasound into a] living body [in accordance with a drive signal, or receiving reflected waves of ultrasound reflected by a bloodstream in the living body]; and

a second piezoelectric element disposed in the channel of the base plate for receiving the ultrasonic signal transmitted by the first piezoelectric element and reflected by the artery.

[a base plate having said piezoelectric element mounted on its one surface,

wherein the other surface of said base plate opposite from said one surface is brought into contact with the living body.]



2. (Amended) A pulse detection device comprising:  
a base plate having a first main surface disposable against a part of a living body during use of the pulse detection device, a second main surface disposed opposite the first main surface, and a channel formed in the second main surface;

a transmitting piezoelectric element [excited in accordance with a drive signal] disposed in the channel of the base plate for generating an ultrasonic signal and transmitting the ultrasonic signal toward an artery in the living body; [to generate ultrasound and to transmit the ultrasound into a living body;]

a receiving piezoelectric element disposed in the channel of the base plate for receiving the ultrasonic signal transmitted by the transmitting piezoelectric element and reflected by the artery [reflected waves of the ultrasound transmitted into the living body and reflected by a bloodstream in the living body,] and for converting the reflected ultrasonic signal [waves] into an electrical signal; and

a detection section for detecting a pulse from the electrical signal [ultrasound generated by said transmitting piezoelectric element and the reflected waves received by said receiving piezoelectric element; and a transmitting/receiving base plate having said transmitting piezoelectric element and

said receiving piezoelectric element provided on its one surface, the other surface of said transmitting/receiving base plate being brought into contact with the living body].

3. (Amended) A pulse detection device according to claim 2[,]; wherein the base plate has an acoustic impedance value which is [of said transmitting/receiving base plate is an] intermediate [value between the] an acoustic impedance value of each of [said] the piezoelectric elements and [the] an acoustic impedance value of the living body.

4. (Amended) A pulse detection device according to claim 2[,]; wherein the [said transmitting/receiving] base plate comprises [is] a glass base plate having a thickness of about 1/4 of [the] a wavelength of the ultrasonic signal [ultrasound] generated by [said] the transmitting piezoelectric element.

5. (Amended) A pulse detection device according to claim 2[, wherein]; further comprising a resin layer disposed in the first main surface of the [said transmitting/receiving] base plate [has a resin layer formed on the other surface].

6. (Amended) A pulse detection device according to claim 5[,]; wherein [said] the resin layer [is formed of] comprises an epoxy-based resin.

7. (Amended) A pulse detection device according to claim 5[,]; wherein [said] the resin layer comprises [is formed of] a silicone-based resin.

11. (Amended) A pulse detection device according to claim 2[,]; further comprising a [supporting] support [base] plate for supporting the [said] transmitting piezoelectric element and [said] the receiving piezoelectric element disposed in the channel of the base plate [positioned on said transmitting/receiving base plate].

12. (Amended) A pulse detection device according to claim 11[, wherein]; further comprising a sealing material [such as a silicone resin is provided] disposed between the [said transmitting/receiving] base plate and [said] the support [supporting base] plate.

13. (Amended) A pulse detection device according to claim 12[,]; wherein [said] the sealing material [is provided so as to surround said] surrounds the transmitting and receiving piezoelectric elements without contacting the transmitting and receiving [and so as not to contact said] piezoelectric elements.

15. (Amended) A pulse detection device according to claim [14,] 2; wherein [the] a thickness of [the] a portion of [said transmitting/receiving] the base plate from a base of the channel to the first main surface thereof [remaining after forming said channel] is about 1/4 of [the] a wavelength of the ultrasonic signal [ultrasound] generated by the [said] transmitting piezoelectric element.

16. (Amended) A pulse detection device according to claim 11; further comprising at least one first electrode disposed on the second main surface of the base plate and at least one second electrode electrically connected to the first electrode and disposed on a surface of the support plate. [11, wherein feeding portions to which an electrical signal is applied are provided on one surface of said transmitting/receiving base plate on which said piezoelectric elements are placed, and feeding portions to be electrically connected to said transmitting/receiving base plate electrodes are provided on the surface of said supporting base plate on which said piezoelectric elements are supported.]

17. (Amended) A pulse detection device according to claim 11[,]; further comprising a metallic bonding for connecting [wherein] at least one of [said] the transmitting piezoelectric element and [said] the receiving piezoelectric element [are joined] to [said] the [transmitting/receiving] base plate [by intermetallic bonding].